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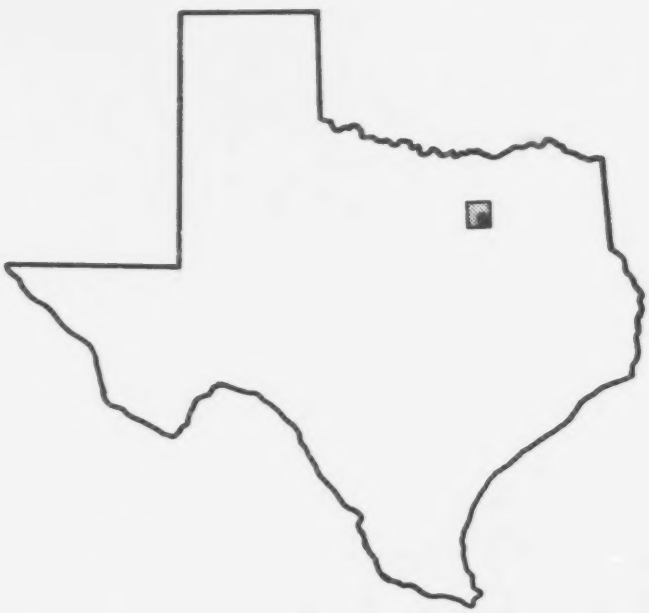
FLOOD INSURANCE STUDY

CITY OF BALCH SPRINGS, TEXAS
DALLAS COUNTY



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Federal Emergency Management Agency

COMMUNITY NUMBER - 480166

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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PUBLISHED SEPARATELY:

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FLOOD INSURANCE STUDY
CITY OF BALCH SPRINGS, TEXAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Balch Springs, Dallas County, Texas, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study represent a revision of the original analyses prepared by the Fort Worth District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 21, and Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 2 and amendments thereto. The work for the original study was completed in May 1979.

In this revision, the hydraulic analyses for portions of South Mesquite Creek were updated by Nathan D. Maier Consulting Engineers, Inc., of Dallas, Texas. This work was completed in June 1987.

1.3 Coordination

On July 13, 1976, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the Community Executive Officer (CEO), the Texas Department of Water Resources (TDWR) representative, and the COE to discuss the streams to be studied by detailed and approximate methods and community base map selection. On July 30, 1976, the city was provided maps showing

areas to be studied. The city concurred with the limits of study. The Soil Conservation Service (SCS), the U. S. Geological Survey (USGS), the State Department of Highways and Public Transportation, and the TDWR were contacted for information related to the study.

On October 11, 1979, a final CCO meeting was held with representatives from FEMA, community officials, and the COE to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Balch Springs, Dallas County, Texas. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: Hickory Creek, Stream 4C6, South Mesquite Creek, and Stream 2B2. This revision reflects changes in base flood elevations, floodway top widths, and 100- and 500-year flood boundaries. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

2.2 Community Description

The City of Balch Springs is located in the eastern portion of Dallas County in north-central Texas, approximately 10 miles southeast of the downtown portion of the City of Dallas. It is bordered by the City of Mesquite to the north; the unincorporated areas of Dallas County to the east; and the City of Dallas to the south, east, and west. The Texas Municipal League lists the estimated 1976 population of Balch Springs as 14,000.

Balch Springs is primarily a residential community with some commercial and industrial development. The northeastern portion of the city is drained by South Mesquite Creek and its tributaries, while the remainder of the city is drained by Hickory Creek and its tributaries.

The climate of the city is warm, temperate, and humid. Summers are hot, and winters are short and mild. Extremes of temperature and precipitation are of relatively short duration. The annual mean precipitation is approximately 35 inches. The mean relative humidity is 63 percent and average temperature is 65.8 degrees Fahrenheit (^{o}F). The record temperature extremes range from a maximum of 111 ^{o}F in July 1954 to a minimum of -3 ^{o}F in January 1930.

The community has terrain characteristic of the Blackland Prairie. The topography is gently rolling to almost level with narrow streams

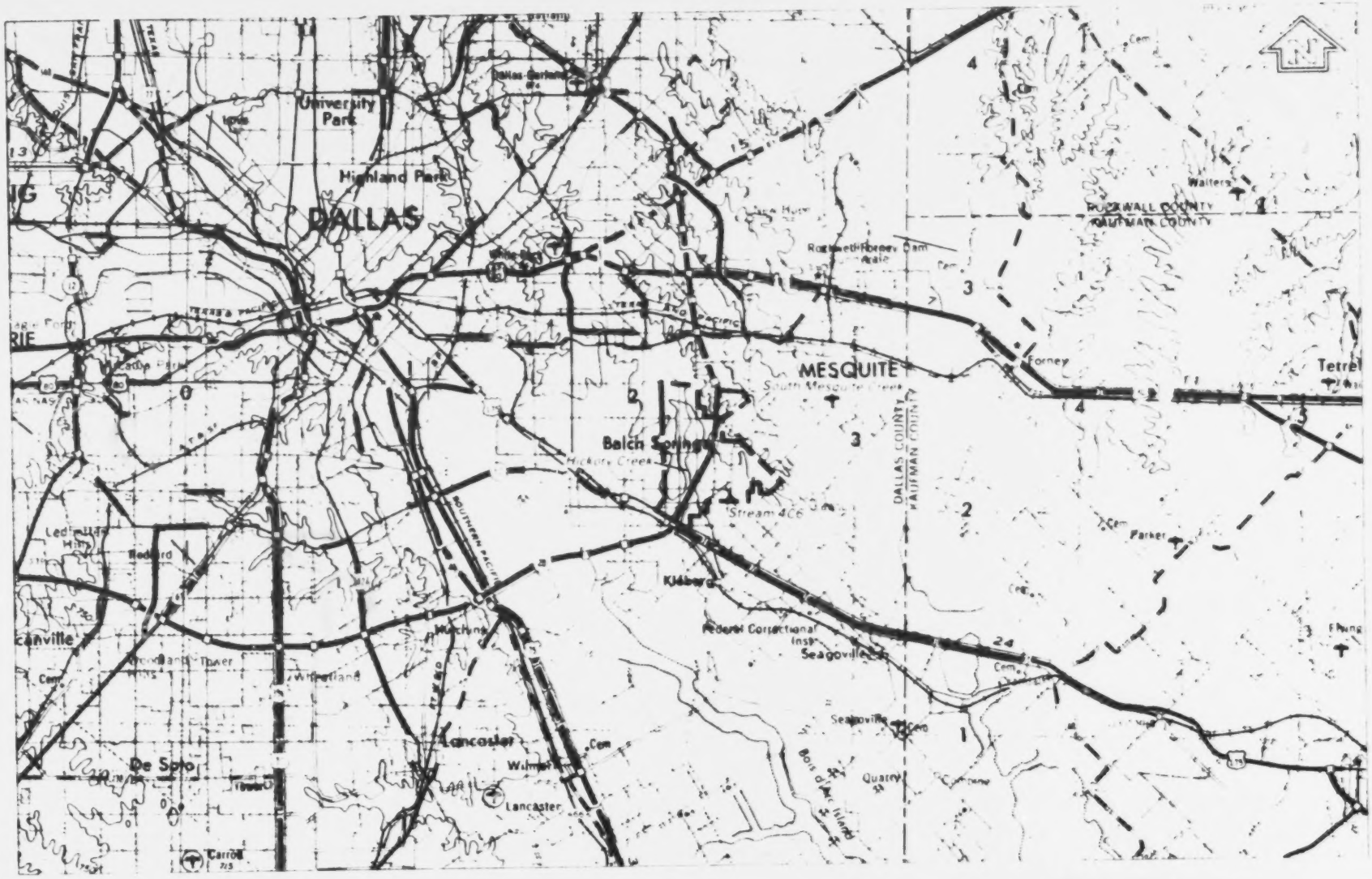


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

being well incised. The soils in the area are mainly of the Houston Black, Heiden, and Austin series. The undeveloped land is devoted to farming and improved short grass pasture. The narrow bands of native timber along the streams and fences include pecan, elm, bois d'arc, mesquite, and a variety of oaks.

2.3 Principal Flood Problems

Most of the flood producing storms that occur in the Balch Springs area are experienced in the spring and fall. Most of the higher floods that have occurred in the general geographical region have resulted from prolonged or successive storms that produce heavy rainfall during this period; however, severe flooding can be produced by intense local thunderstorms at any time.

A search of historical flood information indicates that large floods are known to have occurred on South Mesquite Creek in April 1922, May 1930, April 1942, April 1957, April 1958, July 1962, in 1964, 1965, April 1966, and June 1973 (Reference 1). The flood of April 27, 1957, is believed to be the largest flood to have occurred in the past 55 years. This flood is estimated to have had a recurrence interval of approximately 1 in 50 years. No damage estimates were found for any of the floods mentioned above.

Two persons are known to have drowned during the flood of April 27, 1958, in the City of Mesquite. Little specific historical information is available for Hickory Creek. A large flood is known to have occurred on December 16, 1928. This flood was reported to have overtopped the Southern Pacific Railroad in the lower part of the Hickory Creek Basin (Referenced 2).

It should be noted that the frequency assigned to the historical flood should be viewed with caution since the estimate was made by comparing discharge estimates obtained from historical records with determinations made in connection with this study. The hydrologic determinations for this study are based on existing stream and watershed conditions and differ from the conditions that existed at the time of the historical flood.

2.4 Flood Protection Measures

South Mesquite Creek has been straightened and enlarged in the reach adjacent to the City of Balch Springs. Several short reaches of stream straightening and/or enlargement have taken place in connection with subdivision development and road construction. The City of Balch Springs is currently controlling floodplain development by means of a floodplain zoning ordinance.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood

hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Each of the basins were divided into subareas, and synthetic unit and flood hydrographs were developed at selected locations. Headwater areas of less than one square mile were modeled using the rational method, where Q=CIA. The variables in this method are defined as follows: Q is the peak discharge in cubic feet per second (cfs), C is a runoff coefficient, I is the rainfall intensity in inches per hour for the watershed time of concentration, and A is the drainage area in acres. The USGS established a recording stream gage on South Mesquite Creek at Mercury Road in the City of Mesquite in October 1968. The USGS also established 10 crest-stage gages on South Mesquite Creek in December 1968. A historical discharge-frequency curve was developed at the gage. Discharges computed at the gage for existing urbanization with the synthetic hydrograph and PULS routing procedures agree reasonably with those of the historic discharge-frequency curve. National Weather Service Technical Paper Number 40 was used in developing the 10-, 50-, and 100-year storms (Reference 3). The 500-year storm was based on extrapolated data. Frequency-peak discharges at selected locations were computed.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges." The decrease in peak discharge with an increase in drainage area for some streams is due to watershed shape and/or overbank storage effect.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
HICKORY CREEK					
Above Stream 4C6	4.49	5,600	7,800	8,700	11,000
Below left bank tributary approximately 1,500 feet above Loop 635	3.88	5,100	7,000	7,800	9,800
Above left bank tributary approximately 1,500 feet above Loop 635	3.18	4,200	5,800	6,500	8,200
At Bruton Road	0.85	1,800	2,400	2,650	3,250
STREAM 4C6					
At its mouth	2.40	3,750	5,100	5,700	7,200
At limit of detailed study	1.48	2,800	3,800	4,250	5,300
SOUTH MESQUITE CREEK					
At Belt Line Road	17.83	10,700	17,400	20,700	29,500
STREAM 2B2					
At its mouth	0.82	1,800	2,400	2,650	3,250

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the streams studied by detailed methods were field surveyed and were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 4). The computer-backwater models for Hickory Creek were compared with a COE Flood Plain Information Report for verification of results (Reference 2). Flood profiles were drawn showing computed water-surface elevations for floods of the selected

recurrence intervals. Starting water-surface elevation were based on slope/area determinations.

Channel roughness factors (Manning's "n") used for the hydraulic computations were assigned on the basis of field inspections of floodplain areas and on previous studies by the COE. Channel and overbank "n" values are shown in the following tabulation:

Stream	Cnannel "n"	Overbank "n"
Hickory Creek	0.095 - 0.025	0.065 - 0.025
Stream 4C6	0.075 - 0.055	0.095 - 0.075
South Mesquite Creek	0.065 - 0.035	0.085 - 0.060
Stream 2B2	0.040 - 0.040	0.070 - 0.070

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing floodplain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the flooding sources studied in detail, the 100- and 500-year floodplain boundaries have been delineated using topographic maps (Reference 5).

The 100- and 500-year floodplain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for Stream 4C6 extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Stream 4C6 are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Hickory Creek								
I	38,750	671	4,849	2.87	439.7	439.7	440.6	0.9
J	41,880	390	2,175	4.00	444.4	444.4	445.1	0.7
K	43,300	387	2,151	4.05	448.7	448.7	449.7	1.0
L	44,420	316	2,445	3.56	452.0	452.0	452.8	0.8
M	48,250	460	2,859	2.27	462.3	462.3	463.2	0.9
N	52,320	366	1,679	3.87	471.6	471.6	472.5	0.9
O	53,490	408	2,340	2.78	476.4	476.4	477.2	0.8
P	55,910	585	2,095	2.36	482.6	482.6	483.0	0.4
Q	57,000	733	1,313	3.77	488.2	488.2	489.1	0.9
R	57,245	789	3,923	1.26	488.7	488.7	489.7	1.0
S	58,950	504	1,019	3.73	492.2	492.2	492.9	0.7
T	60,640	560	1,675	2.27	497.0	497.0	498.0	1.0
U	61,610	397	1,145	3.32	499.1	499.1	500.0	0.9
Stream 4C6								
A	1,320	388	2,170	2.86	441.7	441.4	442.4	1.0
B	2,335	347	1,913	2.40	444.0	444.0	445.0	1.0
C	3,485	511	2,136	2.15	447.3	447.3	448.2	0.9
D[4]	4,750	200	673	6.32	451.8	451.8	452.8	1.0
E	5,665	253	1,481	2.87	457.0	457.0	457.9	0.9
F	6,365	177	621	3.14	459.0	459.0	459.8	0.8
G	7,420	267	829	2.35	463.2	463.2	463.8	0.6

[1]Stream distance in feet above mouth.
[2]Measured along cross section alignment.
[3]Water-surface elevation without considering main stream backwater.
[4]Cross section outside corporate limits.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

FLOODWAY DATA

HICKORY CREEK-STREAM 4C6

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Stream 4C6 (continued)								
H	8,780	88	379	5.15	469.0	469.0	469.7	0.7
I	9,590	199	1,016	1.92	479.1	479.1	469.5	0.4
South Mesquite Creek								
H	33,190	920	8,436	2.45	428.6	428.6	429.0	0.4
I	34,270	678	6,769	3.06	429.0	429.0	429.4	0.4

[1]Feet above mouth
[2]Measured along cross section alignment

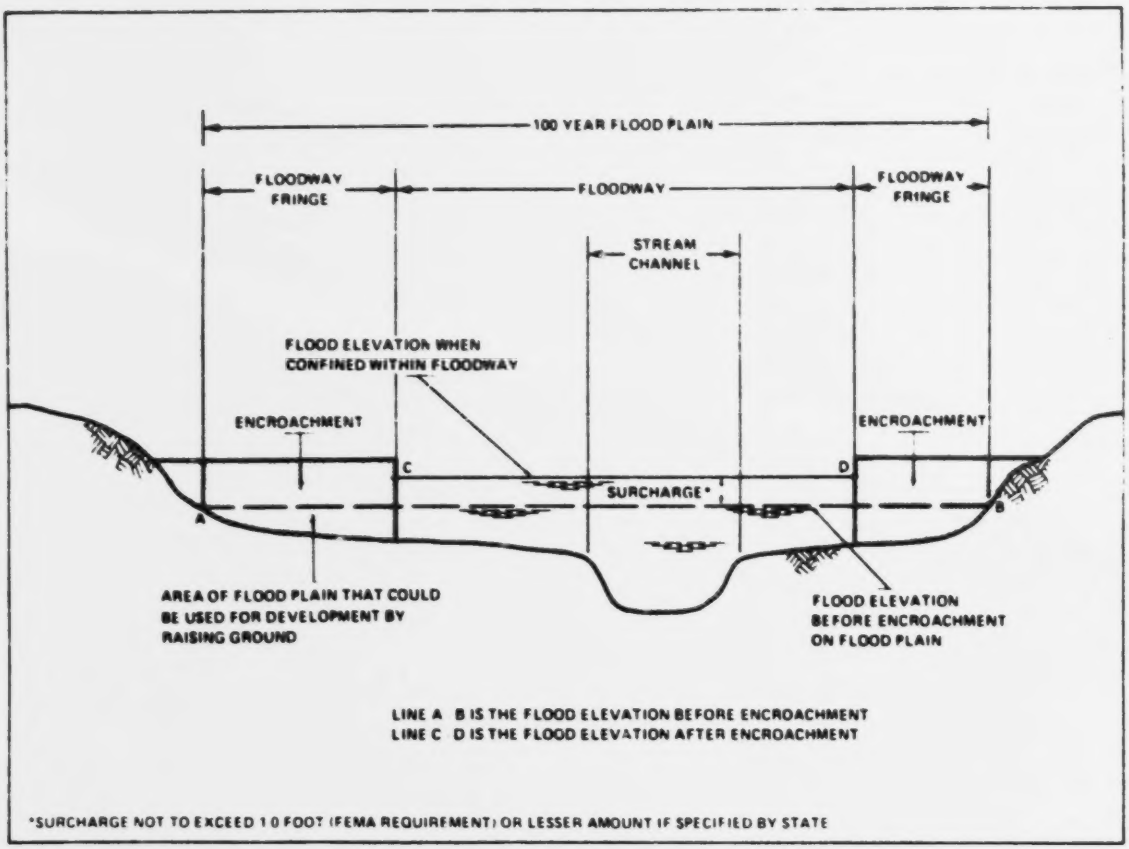
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX
(DALLAS CO.)

FLOODWAY DATA

STREAM 4C6 - SOUTH MESQUITE CREEK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the City of Balch Springs.

5.1 Reach Determinations

Reaches are defined as sections of floodplain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the City of Balch Springs are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one- half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.

Zone A1, A2, A3, and A5: Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Hickory Creek							
Reach 1	0005,0010	-1.3	-0.4	0.9	015	A3	Varies
Reach 2	0005,0010	-0.4	-0.1	0.2	005	A1	Varies
Stream 4C6							
Reach	0010	-0.7	-0.2	0.4	005	A1	Varies
South Mesquite Creek							
Reach 1	0010	-2.5	-0.8	1.4	025	A5	Varies
Stream 2B2							
Reach 1	0010	-1.0	-0.3	0.7	010	A2	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT – SEE MAP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

FLOOD INSURANCE ZONE DATA

HICKORY CREEK–STREAM 4C6–SOUTH MESQUITE CREEK–STREAM 2B2

Zone B: (continued) foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Balch Springs is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

The COE has published two Flood Plain Information Reports (References 1 and 2). The profiles used in those reports differ from those in this study by as much as 2 feet in some reaches due primarily to the difference in watershed and stream conditions, and the fact that more detailed field data were collected, and more sophisticated computations were made to develop the profiles used in this study. Since each of those reports were prepared by the COE, reconciliation of these differences was made within the agency.

A Flood Insurance Study for the City of Mesquite is currently being prepared (Reference 6). The results of that study will be in agreement with the results of this study.

Flood Insurance Studies for the City of Dallas and the unincorporated areas of Dallas County have been prepared (References 7 and 8). The results of this study are in agreement with the results of those studies.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Federal Regional Center, 800 North Loop 288, Denton, Texas 76201-3698.

8.0 BIBLIOGRAPHY AND REFERENCES

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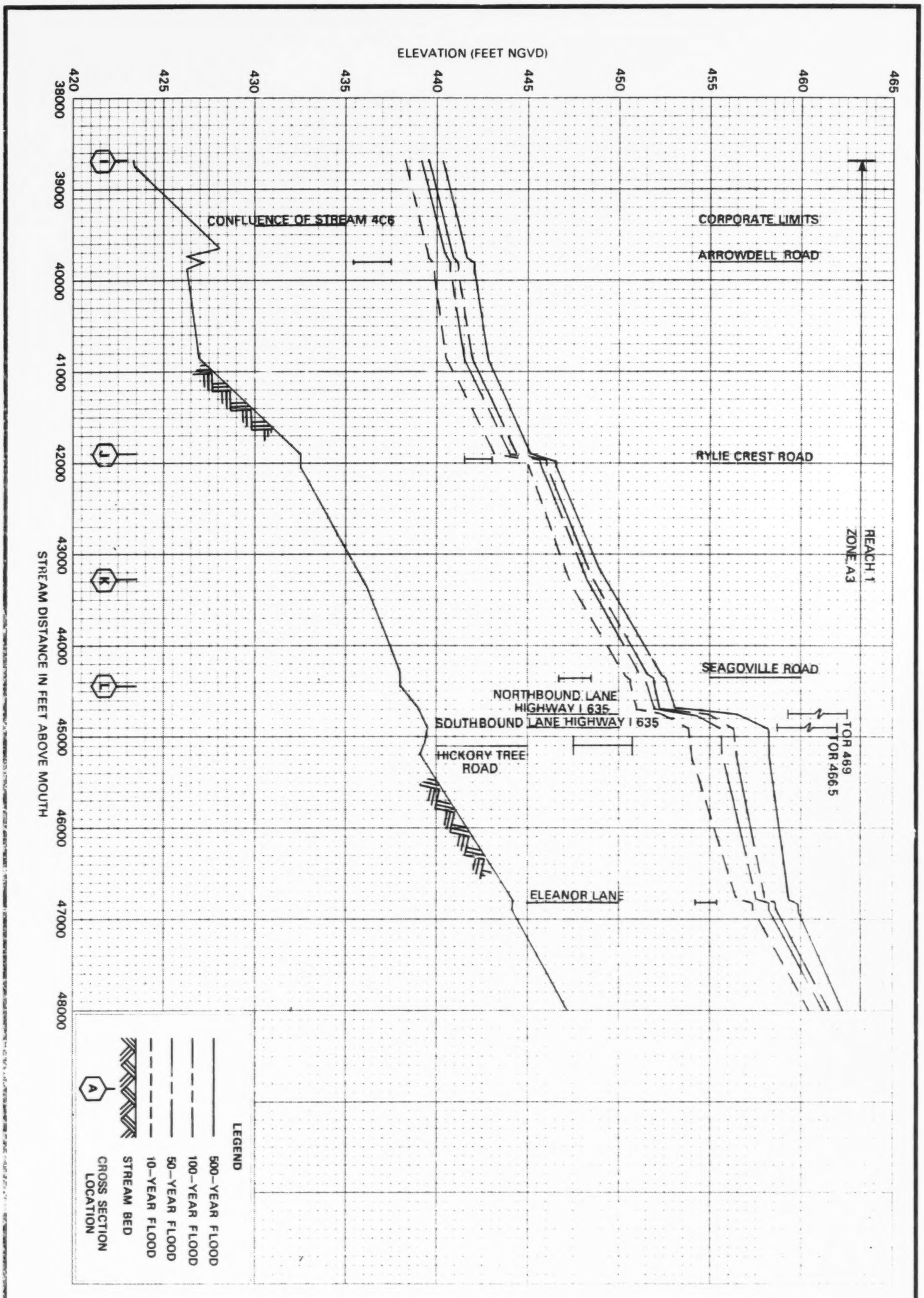
6. Federal Emergency Management Agency, Flood Insurance Study, City of Mesquite, Dallas County, Texas (Unpublished).

7. Federal Emergency Management Agency, Flood Insurance Study, City of Dallas, Dallas County, Texas, Washington, D. C., March 16, 1983.

8. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Dallas County, Texas, Washington, D. C., July 19, 1982.



01P

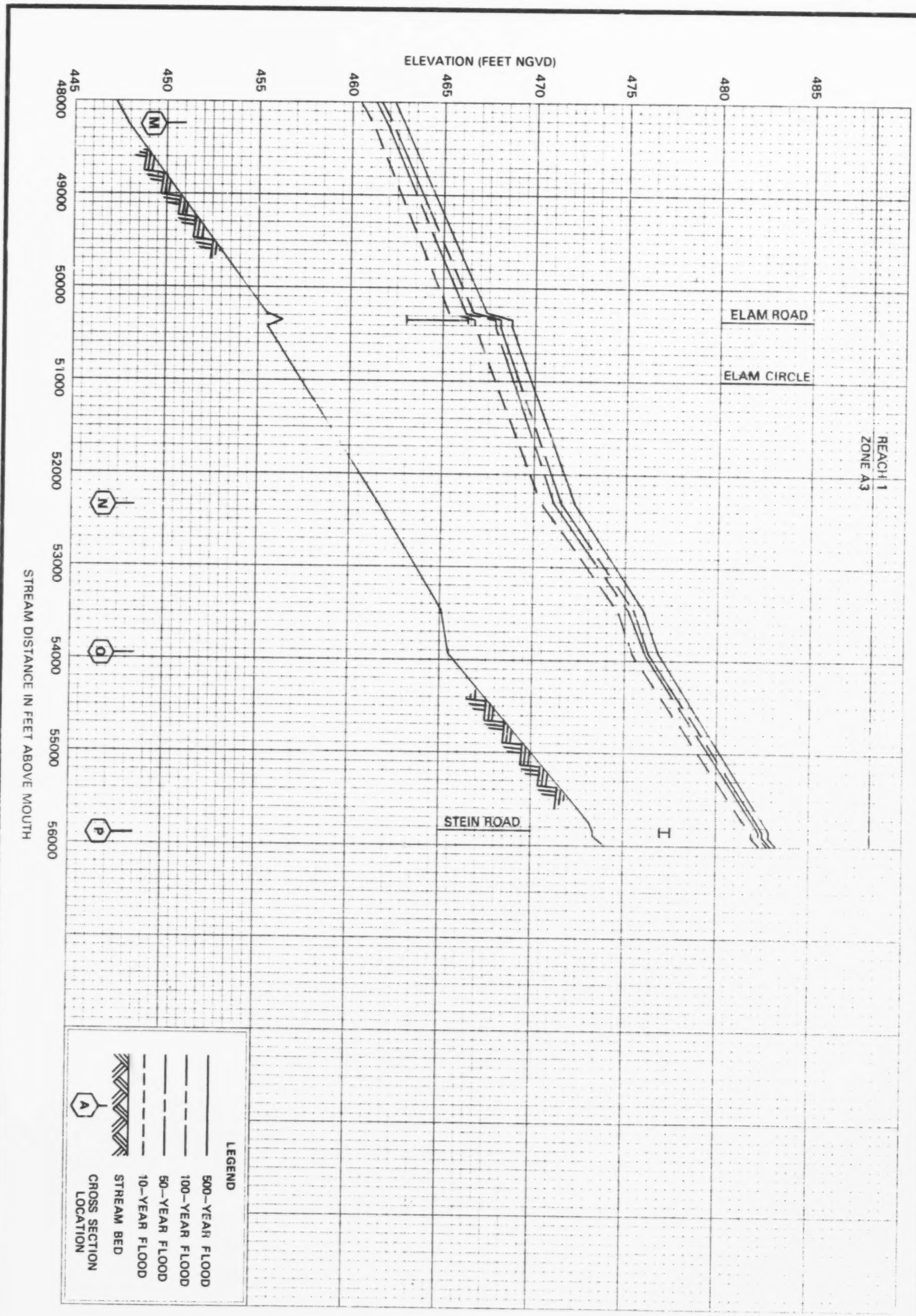
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

FLOOD PROFILES

HICKORY CREEK



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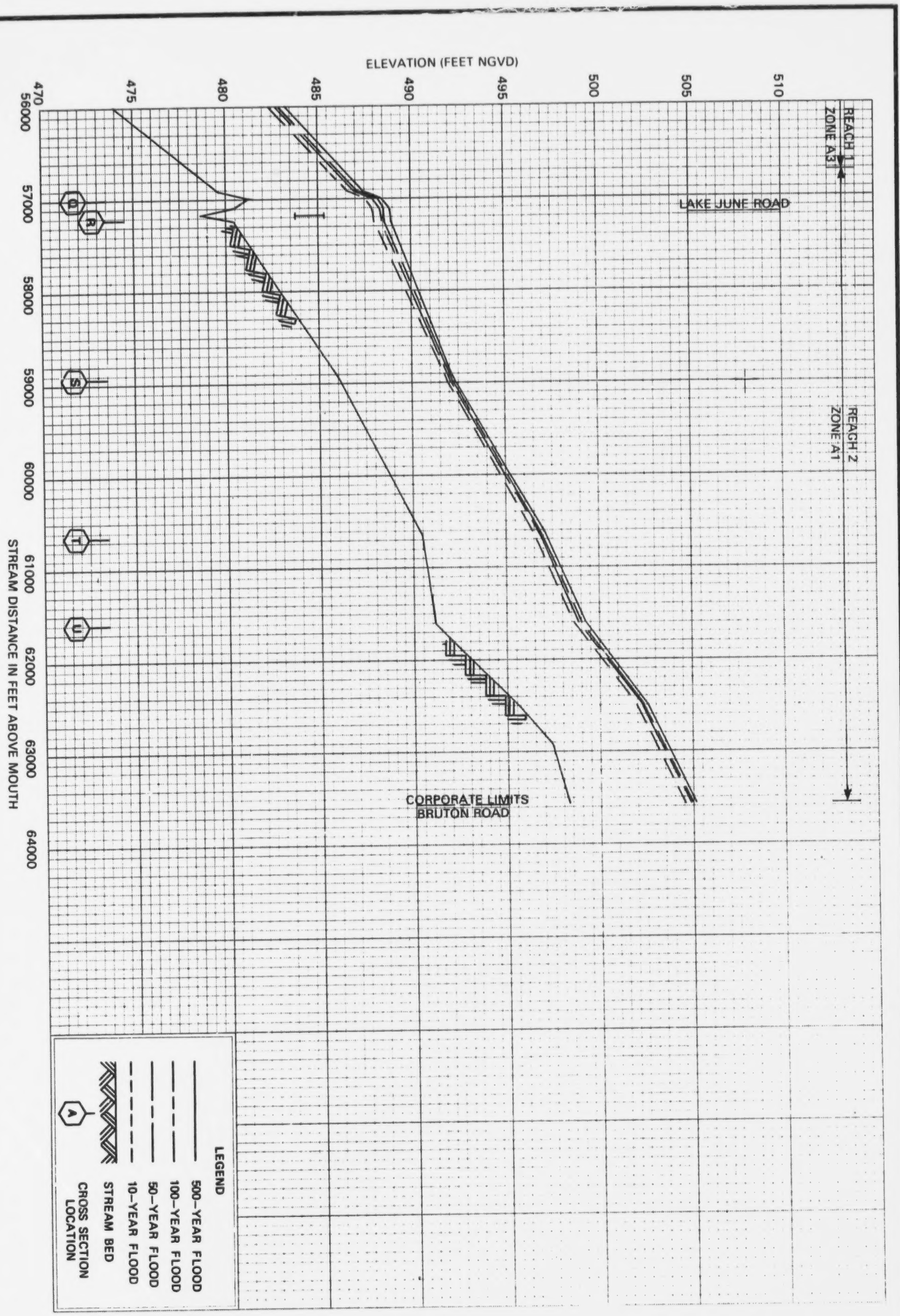


FEDERAL EMERGENCY MANAGEMENT AGENCY

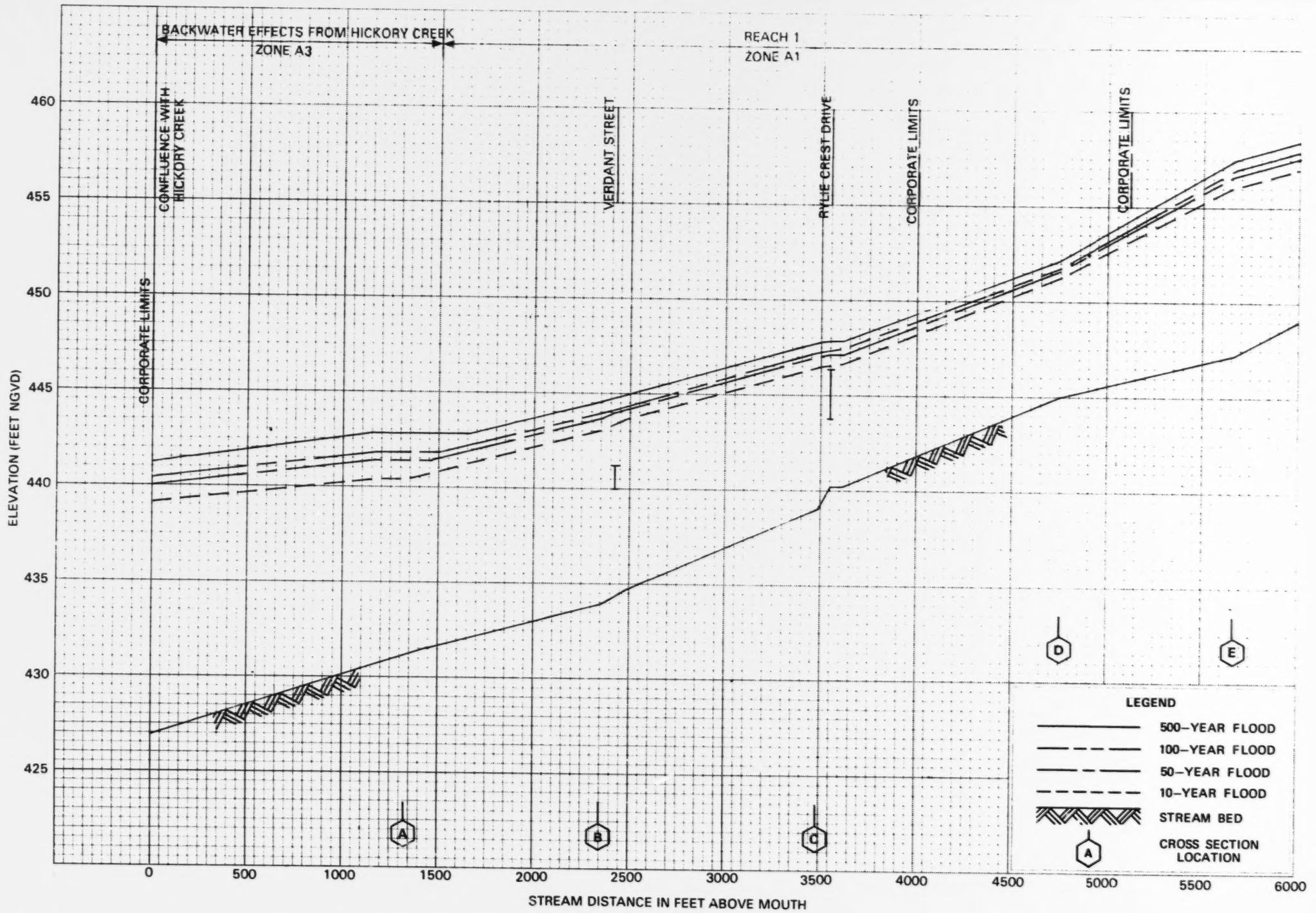
CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

03P

FLOOD PROFILES

HICKORY CREEK



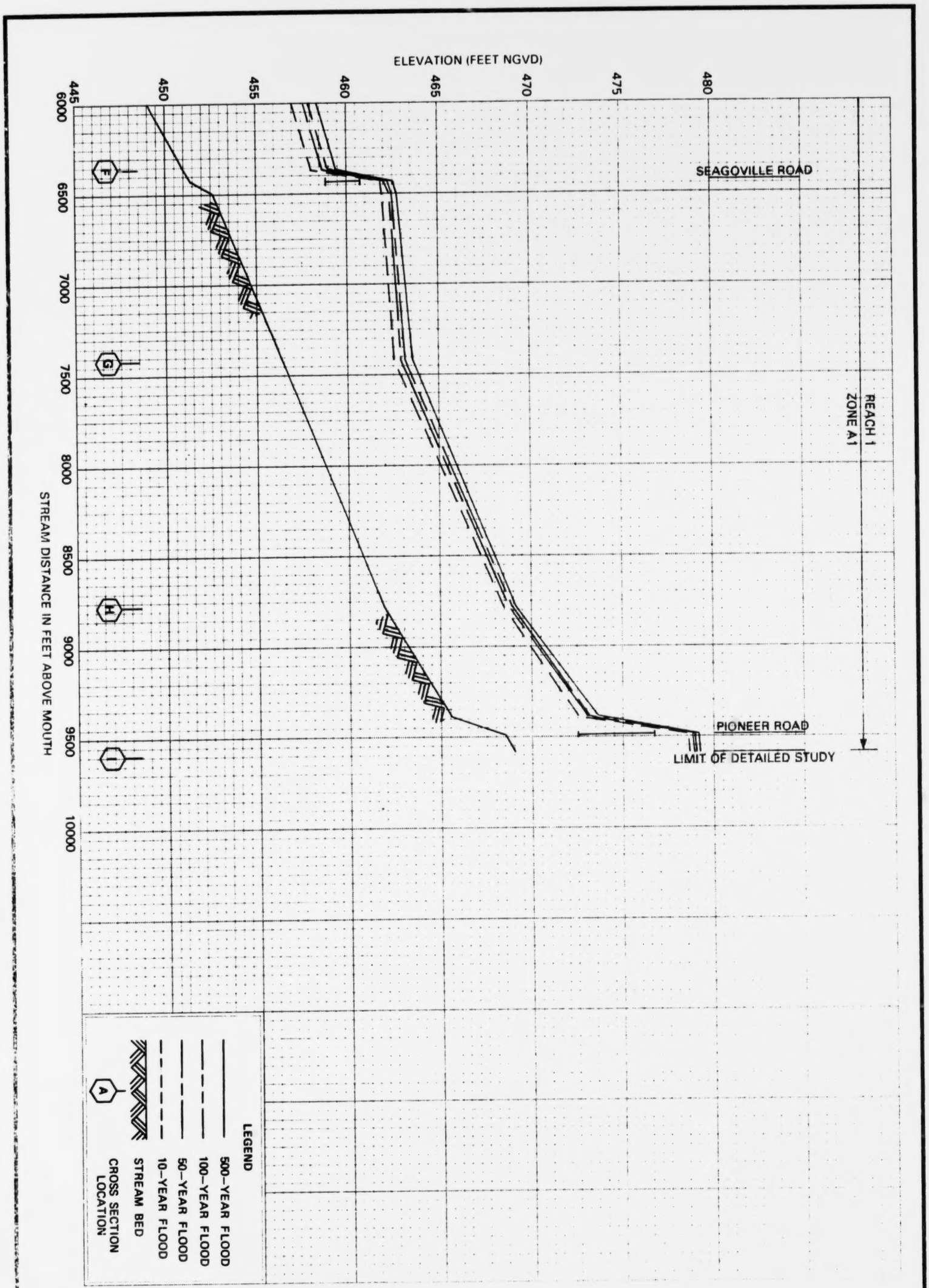
FLOOD PROFILES

STREAM 4C6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX
(DALLAS CO.)

04P



05P

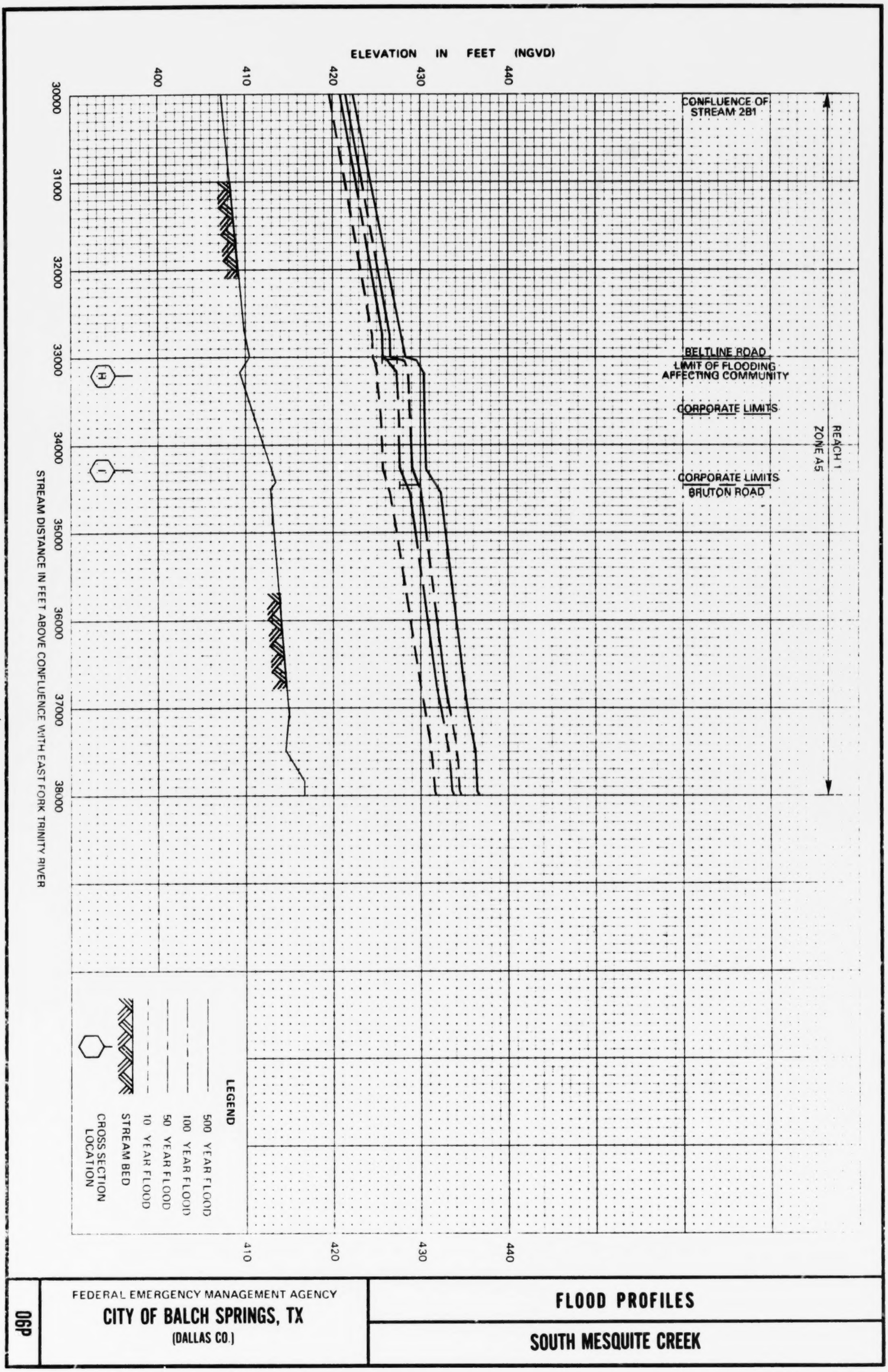
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

FLOOD PROFILES

STREAM 4C6



21

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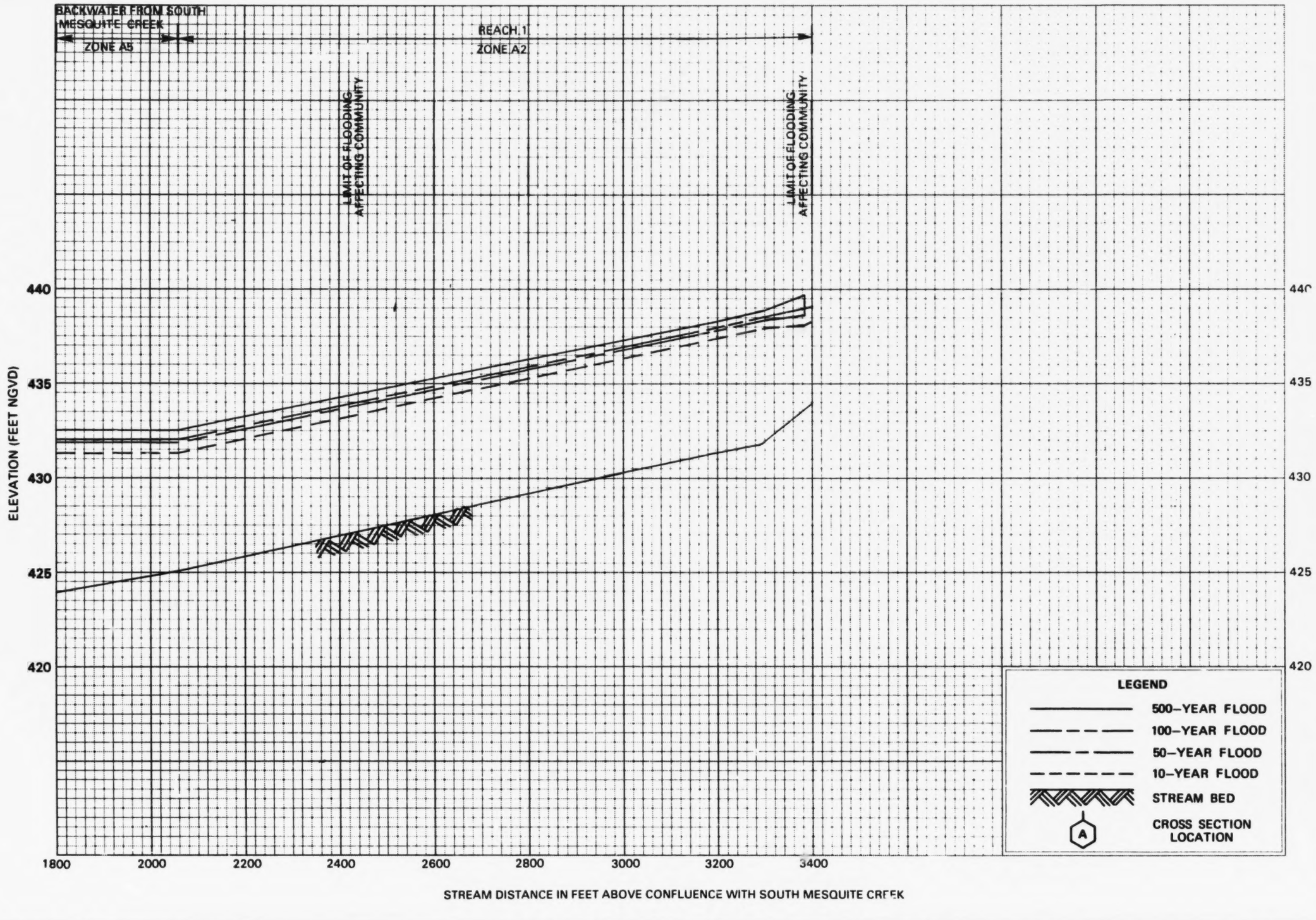

FLOOD PROFILES

STREAM 2B2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BALCH SPRINGS, TX

(DALLAS CO.)

07P